Intern Abstract for Spring 2016

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The Human Interface Branch - EV3 - is evaluating Organic lighting-emitting diodes (OLEDs) as an upgrade for current displays on future spacecrafts. OLEDs have many advantages over current displays. Conventional displays require constant backlighting which draws a lot of power, but with OLEDs they generate light themselves. OLEDs are lighter, and weight is always a concern with space launches. OLEDs also grant greater viewing angles.

OLEDs have been in the commercial market for almost ten years now. What is not known is how they will perform in a space-like environment; specifically deep space far away from the Earth's magnetosphere. In this environment, the OLEDs can be expected to experience vacuum and galactic radiation. The intern's responsibility has been to prepare the OLED for a battery of tests. Unfortunately, it will not be ready for testing at the end of the internship. That being said much progress has been made:

- Developed procedures to safely disassemble the tablet
- Inventoried and identified critical electronic components
- 3D printed a testing apparatus
- Wrote software in Python that will test the OLED screen while being radiated
- Built circuits to restart the tablet and the test pattern, and ensure it doesn't fall asleep during radiation testing
- Built enclosure that will house all of the electronics

Also, the intern has been working on a way to take messages from a simulated Caution and Warnings system, process said messages into packets, send audio packets to a multicast address that audio boxes are listening to, and output spoken audio. Currently, Cautions and Warnings use a tone to alert crew members of a situation, and then crew members have to read through their checklists to determine what the tone means. In urgent situations, EV3 wants to deliver concise and specific alerts to the crew to facilitate any mitigation efforts on their part. Significant progress was made on this project:

- Open channel with the simulated Caution and Warning system to acquire messages
- Configure audio boxes
- Grab pre-recorded audio files
- Packetize the audio stream

A third project that was assigned to implement LED indicator modules for an Omnibus project. The Omnibus project is investigating better ways designing lighting for the interior of spacecraft-both spacecraft lighting and avionics box status lighting indication. The current scheme contains too much of the blue light spectrum that disrupts the sleep cycle. The LED indicator modules are to simulate the indicators running on a spacecraft. Lighting data will be gathered by human factors personal and use in a model underdevelopment to model spacecraft lighting. Significant progress was made on this project:

Designed circuit layout

- Tested LEDs at LETF
- Created GUI for the indicators
- Created code for the Arduino to run that will illuminate the indicator modules